Credit Value Adjustment

CVA

Credit value adjustment is the market price of counterparty credit risk that has become a central part of counterparty credit risk management. By definition, Credit value adjustment is the difference between the risk-free portfolio value and the true/risky portfolio value.

Credit value adjustment not only allows institutions to quantify counterparty risk as a single measurable P&L number, but also offers an opportunity for banks to dynamically manage, price, and hedge counterparty risk. The benefits of CVA are widely acknowledged.

CVA Introduction

CVA History

- Current market practice
  - Discounting using the LIBOR or risk-free curves
  - Using risk-free value for pricing, hedging, P&L
- Real counterparty reality
  - Having different credit qualities from LIBOR
  - Having risk of default
- ISA 39 (International Accounting Standard)
  - Requiring CVA in 2000 (mandatory)
  - Finance and Accounting owning CVA
  - Receiving a little attention in the beginning
  - Becoming significant risk after financial crises

CVA Definition

- Definition

  CVA = Risk free value – True (risky) value

- Benefits
  - Quantifying counterparty risk as a single P&L number
  - Dynamically managing, pricing, and hedging counterparty risk
- Notes
  - CVA is a topic of valuation and requires accurate pricing and risk-neutral measure
  - Risk-free valuation is what we use every day. Risky valuation is less explored and less transparent

Risk-Free Valuation

- The risk-free valuation is what brokers quote or what trading systems or models normally report.
- A simple example to illustrate
  - A zero coupon bond paying X at T
- The risk-free value

$$V^F(0) = X\,exp(-rT) = D(T)X$$

where r is risk-free interest rate and

$D(T) = exp(-rT)$ is risk-free discount factor

Risky Valuation

- Default Modeling
  - Structural models
    - Studying default based on capital structure of a firm
  - Reduced form models
    - Characterizing default as a jump (Poisson) process
  - Market practitioners prefer the reduced form models due to
    - Mathematical tractability
    - Consistency with market observations as risk-neutral default probabilities can be backed out from bond prices and CDS spreads

Reference
https://finpricing.com/lib/EqRainbow.html